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NPIC/P&DS/D/6-728
18 January 1966

MEMORANDUM FOR THE RECORD

SUBJECT: Evaluation of Final Report on PAR 217 Under [redacted] 25X1

Background -

25X1 PAR 217 of Contract [redacted] was concerned with the optimization of the laser for photographic purposes. Its basic task was to explore the production of 0.5 micron wavelength (blue-green) laser radiation by harmonic doubling in certain bi-refringent crystals, those of ammonium di-hydrogen phosphate (ADP) and potassium di-hydrogen
25X1 phosphate (KDP). [redacted] undertook the problem on 2 March 1964 and completed the work on 12 October 1965 at a cost to the Government
25X1 [redacted] The primary objective of this program, as defined at
25X1 the outset by [redacted] was "a final report discussing in detail all investigation and tests accomplished." Special emphasis was to be placed upon reporting; 1) the knowledge gained regarding the combination of a laser with a harmonic doubling crystal element as a source of coherent, visible light radiation; 2) the data organized regarding the use of the laser with a variety of photographic sensitized materials; and 3) recommendations regarding the breadboarding and building of prototype equipment to support the photo-exploitation community.

Evaluation -

An entirely accurate appraisal of the worth of this contract and its final report will be most difficult to make. Due to concurrent advances in the state-of-the-art regarding lasers, several aspects of the prescribed course of study became unavoidably obsolescent during the contract period, while other features retained their original significance throughout. In particular, the development of an operational, continuous wave, gas laser, which radiated in the blue-green wavelength area virtually eliminated the necessity of resorting to the harmonic doubling process with its consequent flicker fusion of discrete pulses from the neodymium-doped, borate glass laser. In view of the above, unforeseen circumstances, it would be both unfair and inaccurate to judge [redacted] work solely upon an 25X1
absolute value basis. Rather, their competence will be evaluated here according to the successes and/or failures experienced in approaching their objectives as originally-stated.

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25X1 In general, [redacted] effort on this contract, appear to have been quite deficient on their own. To a lesser extent, perhaps, than on PAR 216, but still to a most distressing degree, company aloofness from other organizations associated with similar fields of endeavor was conspicuous. Their refusal to consult sources other than their own, their marked aversion toward considering the employment of products other than their own, and their demonstrated inability to conduct a literature search in the required depth and with the appropriate timing: all these fundamental inadequancies would seem to 25X1 indicate that [redacted] just is not capable or desirous of performing proficient, meaningful studies in fields of this nature.

As for the laboratory-oriented portion of this contract, a more competent effort was forthcoming, as far as it went. Unfortunately, it was cut short by the unreported re-allocation of equipment to another project during the reexamination of the goals on this program. 25X1 Prior to that time, [redacted] had successfully completed the initial, mechanical problem-solving stage in achieving operation of the glass laser with a harmonic doubling element. Aside from a theoretical error in some crystallographic considerations and the consequent backtracking in experimental procedure, this phase of the contract seems to have progressed well with some meaningful results. In fact, its description occupies the bulk of the Final Report. Subsequent to this phase were scheduled the photographic tests which promised to yield the results of greatest potential interest to us. These tests, involving image quality and a variety of sensitized materials, however, were virtually eliminated by [redacted] all because of rather 25X1 tentative findings obtained from the previously-reported mishandling of PAR 216. The lone area to receive any detailed attention was that of beam uniformity. Only preliminary results were obtained, however, and no significant quantitative parameters or probable causes could be determined. That the beam would vary in spatial intensity should not have been a surprise to anyone; the correction of this phenomenon is a real photographic concern and a known problem area.

25X1 [redacted] discussion of the conversion efficiency aspects of the second harmonic technique for the generation of visible, coherent radiation is valid, but rather obvious. The necessity of such a high energy, low efficiency method of lasing has become outmoded, and even 25X1 at the time of this contract, [redacted] sole recommendation that we expect a moderately priced, continuous wave, blue-green, gas laser soon to be commercially available was a foregone conclusion by all. In fact, it had to be brought to the attention of the experimenters by the contract monitor.

In short, despite the introductory qualifications expressed, PAR 217 can only be evaluated as substantially a total loss as far as the Government is concerned.

25X1 [redacted]
Development Branch, P&DS